

A New Status for the Dwarf Maidenhair Fern of the Pacific Northwest Coast

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ABSTRACT.—The dwarf maidenhair fern of the Pacific Northwest coast is here recognized as a variety of the western maidenhair fern; that is, as *Adiantum aleuticum* var. *subpumilum*. Reasons are given for this treatment.

KEY WORDS.—*Adiantum aleuticum*, taxonomy, dwarf maidenhair

Along the Pacific Coast of Vancouver Island, British Columbia, grows a variant of the northern maidenhair fern (*Adiantum pedatum* L.) complex that differs from regionally typical material of mesic forest habitats by its much shorter stature and imbricate pinnules. This dwarf coastal form was described as *Adiantum pedatum* L. var. *subpumilum* W.H. Wagner (Wagner and Boydston, 1978). It was considered a variety of *A. pedatum* because western North American plants were considered conspecific with those in eastern North America where the type is from. This dwarf coastal form has been known in cultivation since the 1950's, but the original collection locality was kept secret by its discoverer(s), and wild populations were not re-discovered until 1977 (Wagner and Boydston, 1978). At present the dwarf coastal form is known from four wild populations along the western coast of Vancouver Island, from 48°38'N to 50°10'N.

Paris (1991) separated the western North American representatives of the *Adiantum pedatum* complex (as well as a subset of populations from eastern North America) from the nomenclaturally typical form as *Adiantum aleuticum* (Rupr.) Paris. This was justified by subtle morphological distinctions and isozyme differences between the two taxa. Paris, however, did not recognize any infraspecific taxa in *A. aleuticum*. She believed that morphological differences among populations of *Adiantum aleuticum* were not consistent or predictable, and that results of chloroplast and DNA studies of *A. aleuticum* showed limited genetic divergence among populations (Paris 1991a, b). For that reason, infraspecific taxa within *Adiantum aleuticum* were not recognized in the *Adiantum* treatment for Flora of North America (Paris 1993). Because the *subpumilum* form is apparently a variant of *Adiantum aleuticum*, if *subpumilum* were to be recognized as an infraspecific taxon, it should be treated as a variety or subspecies of *A. aleuticum*, not *A. pedatum*. The need for this treatment was noted previously by Ceska (2000), but he did not make the new combination.

The dwarf coastal form of *Adiantum aleuticum* apparently has a genetic basis for its dwarfed morphology (Olsen, 2007). For over 50 years it has been

maintained in cultivation by propagation from spores. During this time it has kept its smaller stature, suggesting it is not a mere environmental variant. Furthermore, the dwarf coastal form of *A. aleuticum* differs from other morphological variants of this species with imbricate pinnules, particularly those found on ultramafic substrates such as serpentine, with its small fronds and plane (rather than upright) pinnae. In regard to inland variants, such as those described by Cody (1983), most are associated with serpentine and other ultramafic substrates. *Adiantum aleuticum* is in fact a strong serpentinophile in the Pacific Northwest (Kruckeberg, 1969). Variation in the morphology of serpentine forms appears to be, at least in part, a function of the degree of exposure to full sun. For example, plants growing in shady serpentine habitats are extremely vigorous but otherwise not significantly deviant from the morphology exhibited by plants of *A. aleuticum* growing in mesic non-ultramafic habitats. However, variation in *A. aleuticum* throughout its range is deserving of more detailed morphological and genetic study.

There might be an adaptive advantage to the shorter stature exhibited by the dwarf coastal maidenhair fern. Full size fronds of *A. aleuticum* growing on coastal cliffs, where they are exposed to salt laden spray and strong winds, often die back at the distal portions of the pinnae. Genetic mutations that shorten the length of the pinnae could provide a selective advantage in habitats that are exposed to salt spray. These are exactly the habitats in which the wild populations of the dwarf coastal maidenhair fern are found (pers. obs.).

Because the dwarf coastal form of the northern maidenhair fern propagates true from spores, and is known from multiple natural populations in a specific specialized habitat (i.e., coastal cliffs subject to salt spray), it should be recognized as a valid taxon. Recognition of the dwarf coastal maidenhair as a valid taxon, regardless of rank, is important to protect wild populations under private and government biodiversity protection programs. Designation as a variety of *Adiantum aleuticum* rather than a subspecies seems warranted because var. *subpumilum* is essentially geographically sympatric but ecologically allopatric with *Adiantum aleuticum* var. *aleuticum*. For these reasons, the transfer of the dwarf coastal maidenhair fern to *Adiantum aleuticum* is proposed herein:

Adiantum aleuticum (Rupr.) Paris var. *subpumilum* (W.H. Wagner in Wagner & Boydston) E.R. Alverson, **comb. nov.**

Adiantum pedatum L. var. *subpumilum* W.H. Wagner, Canad. J. Bot. 56:1727. 1978. *Adiantum pedatum* L. ssp. *subpumilum* (W.H. Wagner) Lellinger, Amer. Fern J. 74:62. 1984. TYPE.—CANADA, **British Columbia**, Brooks Peninsula, NW Vancouver Island, small drainage system S of Orchard Point, 50°10' N, 127°50' W, 27 June 1977, J. Pojar and F. Boas 770191 (holotype MICH; isotypes V and UBC).

Treatment of the dwarf coastal form of *Adiantum aleuticum* as a variety is warranted because it is a well marked, genetically based morphological variant associated with specific selective habitat parameters under natural conditions.

Further morphological and genetic study of *Adiantum aleuticum* var. *subpumilum* is warranted. The full geographic distribution of this variety has yet to be documented. While populations of var. *subpumilum* occur along much of the length of the west coast of Vancouver Island, similar coastal habitats to the north and south of Vancouver Island should also be searched. For example, populations of *Adiantum aleuticum* occur on coastal cliffs just south of La Push, Clallam County, Washington. It is not clear that the reduced pinna length exhibited by some of these populations has the same genetic basis as Vancouver Island populations of var. *subpumilum* (E. Alverson, pers. obs.). Populations of *Adiantum aleuticum* also occur on coastal bluffs in Oregon, but I have not observed Oregon populations that approach the morphology of var. *subpumilum*. However, these coastal habitats can be extremely difficult and dangerous to access, and further field surveys may provide additional data on the distribution of var. *subpumilum*.

Coastal habitats in British Columbia and the adjacent regions of the Pacific Coast are known for a sizable number of endemic taxa that suggest a significant history of geographic isolation and Pleistocene refugia (Douglas, 1996). *Adiantum aleuticum* var. *subpumilum* is just one of a longer list of vascular plant taxa, including *Enemion savilei* (Calder & Tayl.) Keener, *Geum schofieldii* Calder & Taylor, *Ligusticum calderi* Mathias & Const., *Lloydia serotina* (L.) Reichenb. ssp. *flava* Calder & Taylor, *Saxifraga taylori* Calder & Savile, *Senecio moresbiensis* (Calder & Tayl.) G.W. Dougl. & G. Ruyle-Dougl., *Trillium ovatum* Pursh var. *hibbersonii* Taylor & Szczawinski, and *Viola biflora* L. ssp. *carlottae* Calder & Taylor, that are associated with putative Pleistocene refugia on Vancouver Island and adjacent regions. While most if not all of Vancouver Island was covered by glacial ice during the most recent glacial advance, it is possible that these endemic taxa survived the glacial maximum on the unglaciated coastal margin that was exposed due to lower sea levels, but is now below the present sea level. If *Adiantum aleuticum* var. *subpumilum* is indeed a Pleistocene relict, it may have diverged from *Adiantum aleuticum* var. *aleuticum* before the current Holocene climatic optimum. Further studies of DNA variation could cast more light on the genetic and evolutionary history of *Adiantum aleuticum* var. *subpumilum*.

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